

1 1. A method for detecting the presence of an
2 energetic material in a sample in which the presence of the
3 energetic material is unknown, the method comprising:
4 heating the sample;
5 measuring heat flow between the sample and its
6 surrounding environment; and
7 analyzing the measured heat flow between the sample
8 and its surrounding environment, wherein an exothermal peak
9 in the measured heat flow indicates the presence of the
10 energetic material in the sample.

1 2. The method of claim 1, wherein the heat flow is
2 measured using differential scanning calorimetry.

1 3. The method of claim 1, wherein the sample
2 comprises a plurality of particles, and the method further
3 comprises collecting the particles from air samples.

1 4. The method of claim 1, further comprising
2 collecting the sample from surfaces of passenger clothing,
3 luggage, or cargo.

1 5. The method of claim 1, further comprising
2 collecting the sample from an airport environment.

1 6. The method of claim 1, wherein the heating step
2 comprises heating the sample from about room temperature to
3 a temperature of at least 200°C.

1 7. The method of claim 1, wherein the heating step
2 comprises heating the sample in a substantially anaerobic
3 environment

1 8. The method of claim 1, wherein the heating step
2 comprises heating the sample to temperatures no greater than
3 about 550°C.

1 9. The method of claim 1, wherein the heating step
2 comprises heating the sample to temperatures no greater than
3 about 350°C.

1 10. A method for identifying the presence of a
2 contraband material in a test sample in which the presence
3 of the contraband material is unknown, the method
4 comprising:
5 heating the test sample;
6 measuring heat flow between the test sample and its
7 surrounding environment to produce a test thermogram; and
8 comparing features of the test thermogram to
9 features of reference thermograms for reference samples
10 including known contraband materials, wherein a match of a
11 reference thermogram with the test thermogram identifies the
12 presence of a contraband material.

1 11. The method of claim 10, wherein the contraband
2 material is an explosive or drug.

1 12. The method of claim 10, wherein the heat flow
2 is measured using differential scanning calorimetry.

1 13. The method of claim 10, wherein the heating
2 step comprises heating the sample in a substantially
3 anaerobic environment.

1 14. The method of claim 10, wherein the comparing
2 step comprises comparing temperatures of exotherms,

3 endotherms, or both exotherms and endotherms in the
4 thermogram of the test sample with temperatures of exotherms
5 and endotherms in the reference thermograms.

1 15. A system for detecting the presence of an
2 energetic material in a sample in which the presence of the
3 energetic material is unknown, the system comprising:
4 a thermal measuring apparatus which during operation
5 heats the sample and measures heat flow between the sample
6 and its surrounding environment; and
7 an analyzer coupled to the thermal measuring
8 apparatus which during operation analyzes the heat flow
9 measured by the thermal measuring apparatus to determine the
10 presence or absence of an exothermal peak, wherein the
11 presence of an exothermal peak indicates the presence of the
12 energetic material in the sample and the absence of an
13 exothermal peak indicates the absence of any energetic
14 material in the sample.

1 16. The system of claim 15, wherein the thermal
2 measuring apparatus is a differential scanning calorimeter.

1 17. The system of claim 15, further comprising a
2 collection apparatus that collects and concentrates the
3 sample.

1 18. The system of claim 17, wherein the collection
2 apparatus collects and concentrates the sample by
3 electrostatic precipitation.

1 19. The system of claim 17, wherein the collection
2 apparatus collects and concentrates the sample by solvent
3 extraction.

1 20. The system of claim 15, wherein the thermal
2 measuring apparatus heats the sample in a substantially
3 anaerobic environment.

1 21. The system of claim 15, wherein the thermal
2 measuring apparatus heats the sample to a temperature no
3 greater than about 500°C.

1 22. The system of claim 15, wherein the thermal
2 measuring apparatus heats the sample to a temperature no
3 greater than about 350°C.

1 23. A system for identifying the presence of a
2 contraband material in a test sample in which the presence
3 of the contraband material is unknown, the system
4 comprising:

5 a thermal measuring apparatus which during operation
6 heats the test sample, measures heat flow between the test
7 sample and its surrounding environment, and records a test
8 thermogram of the test sample based on the measured heat
9 flow; and

10 an analyzer coupled to the thermal measuring
11 apparatus which during operation compares features of the
12 test thermogram to features of one or more reference
13 thermograms for reference samples including known contraband
14 materials and determines whether there is a match between a
15 reference thermogram and the test thermogram to identify the
16 presence of a contraband material.

1 24. The system of claim 23, wherein the thermal
2 measuring apparatus is a differential scanning calorimeter.

1 25. The system of claim 23, further comprising a
2 collection system that collects and concentrates the sample.

1 26. The system of claim 23, wherein the reference
2 thermogram stored is a thermogram of a drug.

1 27. The system of claim 23, wherein the reference
2 thermogram is a thermogram of an explosive.

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1 28. The system of claim 23, wherein the analyzer
2 stores a set of reference thermograms.

1 29. The system of claim 23, wherein the analyzer
2 compares temperatures of exotherms, endotherms, or exotherms
3 and endotherms in the thermogram of the test sample with
4 temperatures of exotherms and endotherms in the reference
5 thermograms.

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